WHAT IS CLAIMED IS:

1. A quadrupole ion trap for use in a mass spectrometer comprising:

a) a ring electrode,

b) a pair of end caps,

c) an RF trapping voltage source for applying a trapping voltage to the ring electrode, and

d) computer controlled apparatus for selectively applying pre-calculated waveforms to the end caps for isolating an ion with a specific mass to charge ratio.

2. The quadrupole ion trap as defined by claim 1, wherein the computer controlled apparatus comprises a memory for storing a library of optimized notched waveforms with each waveform being pre-calculated for a specific mass.

3. The quadrupole ion trap as defined by claim 2, wherein the memory further comprises a library of single frequency CID waveforms for use in collision induced dissociation of an isolated ion.

4. The quadrupole ion trap as defined by claim 3, wherein the computer controlled apparatus further comprises a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for amplification of the analog signal.

5. The quadrupole ion trap as defined by claim 2, wherein the computer controlled apparatus further comprises a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for amplification of the analog signal.

6. The quadrupole ion trap as defined by claim 1, and further comprising a trapping parameter adjusting means for matching secular frequency of a particular ion to a central frequency of the pre-calculated waveform.

7. The quadrupole ion trap as defined by claim 6, wherein the trapping parameter adjusting means adjusts amplitude of the trapping voltage.

8. In a quadrupole ion trap mass spectrometer having a ring electrode, a pair of end caps, an RF trapping generator, the improvement comprising:

computer controlled apparatus for selectively applying pre-calculated waveforms to the end caps for isolating an ion with a specific mass to charge ratio.

9. The improvement as defined by claim 8, wherein the computer controlled apparatus includes a memory for storing a library of optimized notched waveforms with each waveform being pre-calculated for a specific mass.

10. The improvement as defined by claim 9, wherein the memory further comprises a library of single frequency CID waveforms for use in collision induced dissociation of an isolated ion.

11. The improvement as defined by claim 8, wherein the computer controlled apparatus further comprises a trapping parameter adjusting means for matching secular frequency of a particular ion to a central frequency of the pre-calculated waveform.

12. The improvement as defined by claim 11, wherein the trapping parameter is an amplitude of a RF trapping voltage.

13. In a method of isolating a selected parent ion having a mass, M, for MS/MS spectrometry employing a quadrupole ion trap (QIT), said QIT having a ring electrode, a pair end caps, an RF trapping voltage source for applying the trapping voltage to the ring electrode, and an RF voltage source connected to the end caps, said method including the steps of:

a) storing pre-calculated waveforms for isolating ions of specific mass to charge ratios, and

b) selectively applying a pre-calculated waveform to the end caps for isolating an ion with specific mass to charge ratio.

14. The method as defined by claim 13, wherein step a) includes providing a computer controlled memory for storing a library of digitally defined optimized notched waveforms with each waveform being pre-calculated for a specific mass.

15. The method as defined by claim 14, wherein step b) includes providing a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for the analog signal.

16. The method as defined by claim 14, wherein step a) further includes storing a library of single frequency CID waveforms for use in collision induced dissociation of an isolated ion.

17. The method as defined by claim 16, wherein step b) includes providing a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for the analog signal.

18. The method as defined by claim 13, further including the step of:

adjusting a trapping parameter for matching secular frequency of a particular ion to a central frequency of the pre-calculated waveform.

19. The method as defined by claim 18, wherein the trapping parameter is RF trapping voltage amplitude.